State & Regional Success – How We're Supporting the National Effort

(The Business of CHP)

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Developing the Business Case

- **Step #1: Targeted Audience**
- **Step #2: Address Technical Risk**
- **Step #3: Address Economic Viability**
- **Step #4: Regulatory / Local Climate**
- **Step #5: Case Studies / Project Profiles**

Step #1: Targeted Audience

- **One Day Workshops Aimed at Specific Market Sectors**
- **Address Key Decision Makers**
  - **Facility / Energy Managers**
  - **Financial Officers**
- **Objective / Bottom Line:**
  - **Does CHP Make Sense In My Facility and How Do I Answer That Question?**

Midwest CHP Application Center

- **Full Gamut of Targeted Workshops / Courses**
  - **Ethanol Industry**
  - **Biomass (Swine)**
  - **State Regulators**
  - **Hotels**
  - **Hospital / Healthcare**
  - **K thru 12 Schools**
  - **A/E Firms**
  - **Industrial Firms**
  - **Industrial Assessment Centers**

Step #2: Address Technical Risk

- **CHP is a Low Technical Risk, Provided You:**
  - **Utilize Proven Technologies**
  - **Utilize Good Engineering Design Practices**
  - **Follow Prescribed Maintenance Practices**
- **CHP – The Concept**
  - **Definitions**
  - **Advantages / Issues**
  - **Technologies**

Step #3: Address Economic Viability

- **Natural Gas Is Still the Most Common Fuel Of Choice For CHP (much tougher sell)**
  - **High Gas Prices ---- Smaller Spark Spreads**
  - **Gas Price Volatility --- Uncertainty**
  - **Future Electric Prices --- Uncertainty**
- **Approach:**
  - **Standard Calculation / Estimate of Energy and Utility Bill Savings**
  - **Sensitivity Analysis Based On Varying Both the Natural Gas & Electric Prices**

Approach (cont'd)

- **Investigate "Opportunity Fuels" When Applicable**
- **Identify and Quantify Other Benefits Specific to the Targeted Market Sector:**
  - **Voltage Sags / Instantaneous Outages**
  - **Emission Controls (VOCs)**
  - **Riding Thru Blackouts**
  - **Energy Security**
  - **Quality Power Requirements**
- **Financing Options**

Step #4: Regulatory & Local Climate

- **How Approachable and Cooperative Is the Local Electric Utility?**
- **What Are the Grid Interconnect Rules, Standby Charges, Peak / Off-Peak Rates, Buyback Rates?**
- **How Favorable Are the Local and State Agencies (including the utility commissions)?**
- **Where Can They Get Assistance for the Next Steps?**

Step #5: Case Studies / Project Profiles

- **Identify Where Similar Companies / Facilities Have Invested In CHP**
- **Develop Project Profiles On Those CHP Installations**
- **Workshop Panel Discussion With Colleagues That Have CHP Experience**

Beloit Fact Sheet

Beloit Memorial Hospital

3.0 MW CHP Application

Project Profile

combined heat & power in healthcare

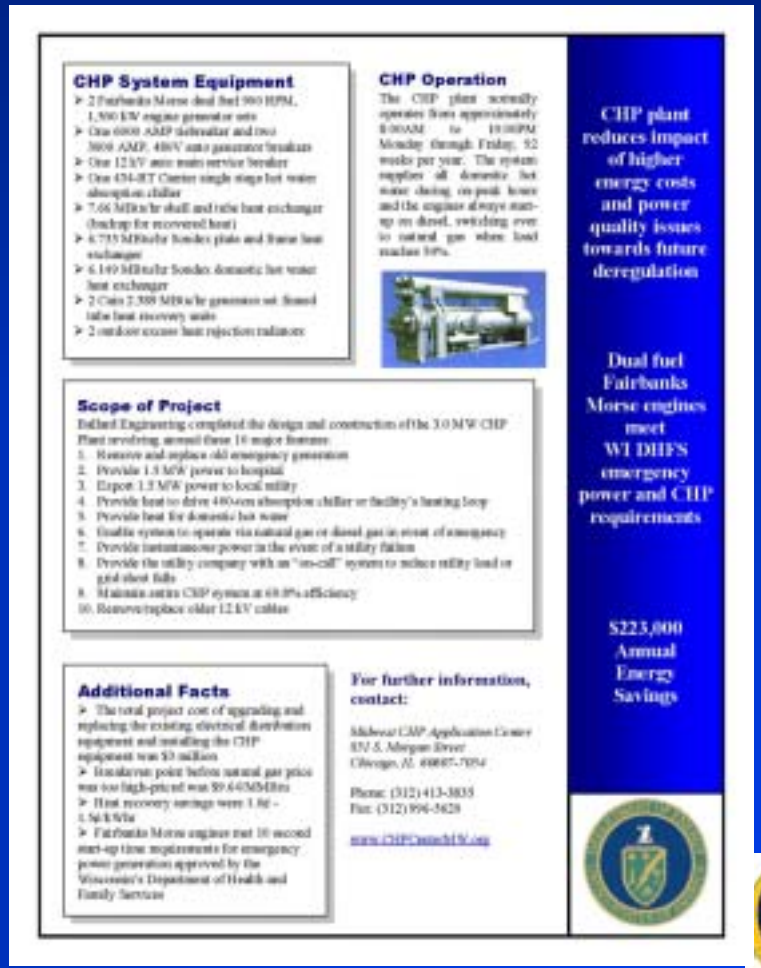
Quick Facts

Project Overview

Reasons for CHP

"Upgrade Energy Distribution"

"Future Deregulation"



CHP System Equipment

- 2 Fairbanks Morse dual fuel 900 HPM, 1,500 kW engine generator sets
- One 6000 AMP tielbreaker and two 3000 AMP, 480V auto generator breakers
- One 12 kV auto main service breaker
- One 454-RT Carrier single stage hot water absorption chiller
- 7.66 MBtu/hr shell and tube heat exchanger (backup for recovered heat)
- 6.735 MBtu/hr Bowles plate and frame heat exchanger
- 6.149 MBtu/hr Bowles domestic hot water heat exchanger
- 2 Cain 2.309 MBtu/hr generator set finned tube heat recovery units
- 2 outdoor excess heat rejection radiators

CHP Operation

The CHP plant normally operates from approximately 8:00AM to 10:00PM Monday through Friday, 52 weeks per year. The system supplies all domestic hot water during on-peak hours and the engines always start-up on diesel, switching over to natural gas when load reaches 50%.

CHP plant reduces impact of higher energy costs and power quality issues towards future deregulation

Dual fuel Fairbanks Morse engines meet WI DHFS emergency power and CHP requirements

$223,000 Annual Energy Savings

Scope of Project

Ballard Engineering completed the design and construction of the 3.0 MW CHP Plant involving around these 10 major features:

1. Remove and replace old emergency generators
2. Provide 1.5 MW power to hospital
3. Export 1.5 MW power to local utility
4. Provide heat to drive 480-ton absorption chiller or facility's heating loop
5. Provide heat for domestic hot water
6. Enable system to operate via natural gas or diesel gas in event of emergency
7. Provide instantaneous power in the event of a utility failure
8. Provide the utility company with an "on-call" system to reduce utility load or grid shed falls
9. Maintain entire CHP system at 69.8% efficiency
10. Remove/replace older 12 kV cables

Additional Facts

- The total project cost of upgrading and replacing the existing electrical distribution equipment and installing the CHP equipment was $3 million
- Breakeven point before natural gas prices was too high-priced was $9.64/MMBtu
- Heat recovery savings were 1.6[illegible]
- Fairbanks Morse engines met 10 second start-up time requirements for emergency power generators approved by the Wisconsin's Department of Health and Family Services

For further information, contact:

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Midwest CHP Application Center

- **U.S. DOE Sponsored Center With Support From The Eight Midwest States**
- **Initiated In March 2001**
- **Service Area Includes:**
  - **Illinois - Minnesota**
  - **Indiana - Missouri**
  - **Iowa - Ohio**
  - **Michigan - Wisconsin**
- **Close Coordination With The Midwest CHP Initiative**

Midwest CHP Application Center

- **Application Experience:**
  - **Hospitals/Healthcare - Colleges**
  - **High Schools - Industrial Plants**
  - **Casinos - Museums**
  - **Hotels - Airport**
  - **Office Buildings - Ethanol Plants**
  - **911 Emergency Centers**

Midwest CHP Application Center

- **Specialty Reports / Studies**
  - **Emissions Guidebook**
  - **CHP Resource Guidebook**
  - **Midwest CHP Roadmap Report**
  - **State Baseline Characterization Reports**
  - **State Hospital Characterization Reports**

For Further Information

- **Midwest CHP Application Center**

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